Fact Sheet:

Environmental Knowledge Base Advisor for Facility Life-Cycle Decisions

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The Problem

Sensitivity to environmental concerns has grown in recent years and is becoming a highly visible national priority. Buildings and facilities are a major environment component. Environmental impacts are felt throughout the entire life-cycle of a building, including the use of resources and consumption of energy. Also, emissions and contaminants are present in the air in homes and workplaces, and building debris takes up 10-30 percent of landfill space, making it second only to paper waste in many locations.

Decisions made throughout a facility's life-cycle, however, do not usually take into account environmental performance such as indoor air quality (IAQ), waste production, and manufacturing processes. Some information sources exist, but they may be difficult to follow. Designers, builders, and operators do not have a convenient, well-grounded means of incorporating environmental factors into their decision-making processes.

Comprehensive, accurate information must be made available to the appropriate users to provide recommendations and evaluations applicable to specific project requirements, thereby reducing the potential for adverse environmental effects.

The Technology

The U.S. Army Construction Engineering Research Laboratories (CERL) and the U.S. Environmental Protection Agency'sAir pollution prevention and Conttrol

Division (APPCD), are developing a personal computer-based environmental advisor system using advanced artificial intelligence and object-oriented technologies. The system evaluates the environmental impact of building designs, addressing issues such as resource depletion, energy use, and other impacts of materials' production processes; exposure of the building's occupants to emissions and contaminants; and disposal considerations such as recycling potential, handling and control requirements, or landfill characteristics. The evaluation capability can be used on specific materials, material collection (systems or assemblies), or entire buildings. The system can assess these individually or compare them with alternatives. The system will provide the following:

* Advice on environmentally sensitive techniques or material alternatives.
* A thorough and accessible knowledge base of materials information.
* A Case Base of building examples, environmentally sensitive methods, and materials.
* Intuitive user interface.
* Compatibility with existing software environments such as energy analysis, cost-estimating, and IAQ exposure tools.

CERL is primarily responsible for the development of a set of decision maps that guide the overall process and has contracted with Stottler Heneke Associates under a Small Business Innovative Research (SBIR) initiative to develop the system. APPCD is responsible for addressing IAQ and pollution prevention issues and developing data for the life-cycle assessment of building and construction materials.

Benefits/Savings

Direct benefits of the Environmental Knowledge Base Advisor will accrue throughout the material and equipment manufacturing processes, construction, facility operation, and disposal phases of a facility's life-cycle. These include the reduction of adverse impacts on resource consumption; undesirable waste products generated during manufacturing, construction, and the building's life-cycle; exposure to hazards (i.e., contaminants) for manufacturing and

construction personnel and the building's occupants; pollution generated during construction activities; and operating expenses through energy and resource efficiency. Another direct benefit is the improved service life of materials and systems. Benefits related to demolition and disposal include reduction in undesirable waste products upon demolition and disposal and increased opportunities for materials' reuse or recycling.

Furthermore, Executive Order #12873, regarding Federal Acquisition, Recycling, and Waste Prevention, states that the Administration is "determined to strengthen the role of the Federal Government as an enlightened, environmentally conscious and concerned consumer" and "... the use of recycled and environmentally preferable products and services by the Federal Government can spur private sector development of new technologies and use of such products, thereby creating business and employment opportunities and enhancing regional and local economies and the national economy." The Order specifically identifies "construction" supplies and services as one target area.

Status

During FY97 the EnvKB System was completed. The system is publicly available from CERL or Stottler, Henke Assoc. Inc. in Compact Disk format. SHAI and the publication *Environmental Building News* will release a commercial version of EnvKB in 1998.

Points of Contact

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